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Physicist's vision leads to advances in AF science

by Rudy Purificato, 311th Human Systems Wing

BROOKS AIR FORCE BASE, Texas — The discoverer of a vision-enhancing technique used in LASIK surgery had a clear vision at an early age that a scientific career would be his future calling. Now, a former Air Force top atomic and molecular physicist is being called to another career as a entrepreneur-inventor who has partnered with his son in a private venture to create scientific marvels with Thomas Edison-like efficiency.

The end of a 34-year Air Force civil service career at Brooks in June represented a new beginning for Dr. John Taboada as he segued from being an Air Force Research Laboratory senior research physicist to the full-time responsibility of running Taboada Research Instruments Inc.

"We're developing one-of-kind special measurement instruments. Our motto is 'we can measure anything'," said Taboada of his enterprise located in a 5,000 square foot facility near Fort Sam Houston. Its success partially rests with Taboada's son John who possesses a special pedigree as chief executive officer. The son has a doctorate degree in applied optics and is currently studying patent law while completing law school. Several of his father's inventions have patents pending.

Taboada more than 'measured up' to professional challenges when he began working at Brooks in 1968 for the U.S. Air Force School of Aerospace Medicine's Radiation Sciences Division. During his career-long tour, Taboada pioneered the development of special devices, made several important scientific discoveries and advanced scientific understanding of concepts with futuristic applications.

Among his more important contributions was his discovery of photo refractive keratectomy (PRK), a technique that uses laser energy to resurface the eye's cornea to produce improved vision. Today, Brooks scientists are completing an Air Force Surgeon General initiated PRK study that will possibly result in a future option for aviators seeking corrective surgery.

"Between 1974 and 1979 everybody was talking about correcting vision," Taboada said. At the time, he worked for USAFSAM's Laser Effects Branch concentrating on retinal effects studies using extra-short pulse lasers.

His research advances laser hazards effects understanding and also provided useful data on how the eye's molecular processes work.

Taboada was also involved in the world's first corneal tissue experiment using an excimer laser. "We worked on other projects related to the cornea," he said, noting that thermal effects experiments were conducted to reshape the cornea using heat. "The

physics proved that short UV laser pulses would have exceptional material removing qualities without causing (corneal) collateral damage."

Taboada later developed a one-of-a-kind instrument (patent pending) to measure the haze or loss of transparency that develops in the cornea after a PRK procedure.

His visionary work in corneal reshaping was overshadowed by the Air Force's priorities during the Cold War to counter the emerging threat of Soviet Union laser weapons.

"I switched to studies on high energy laser impact on aircraft windscreens," he said. This resulted in Taboada's design and construction of the first computerized laser optic aircraft windscreen analyzer. He also developed a computer model for aircraft flights through nuclear bomb fallout. Variations on his model were subsequently included in defense strategy planning.

Taboada's scientific journey is fueled by his passionate curiosity.

As a Fox Tech High School student, Taboada became interested in elementary particle physics. This led to his Alamo Regional Science Fair grand prize-winning project involving a device that measures cosmic rays. He eventually earned a doctorate degree in condensed matter physics from Texas A&M University.

His earliest Brooks research, involving lean body mass measurement, validated other scientific studies that showed everyone who had lived in the U.S. during the 1950s and 1960s had been exposed to radioactive fallout. He discovered in several hundred-research subjects trace amounts of radioisotope Cesium 137.

"Everyone was radioactive," he said, explaining that nuclear testing fallout had affected America's food chain. "Fortunately, it (Cesium 137) dissipates in 10 years."

Among Air Force research discoveries Taboada made that will be the focus of his entrepreneurial investigations is the fascinating future possibility of creating 'bionic' human vision.

He also plans to further explore the controversial concept first espoused by a Hindu scientist in the 1930s known as the Raman spectrum. "I confirmed other scientist's observations that the potential exists for biological cell material to communicate through waves called solutions," he said. Taboada explained that cancer cells have a different 'spectrum' (or pathological way of communicating) than normal cells. @